Fig. 1
PRIOR ART

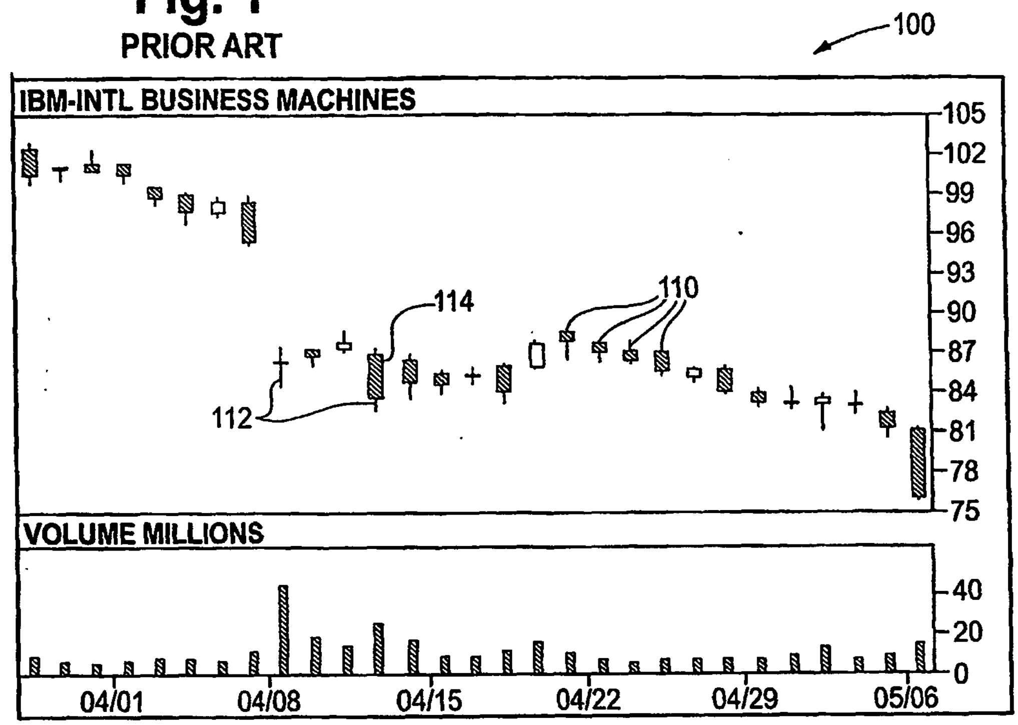


Fig. 2
PRIOR ART

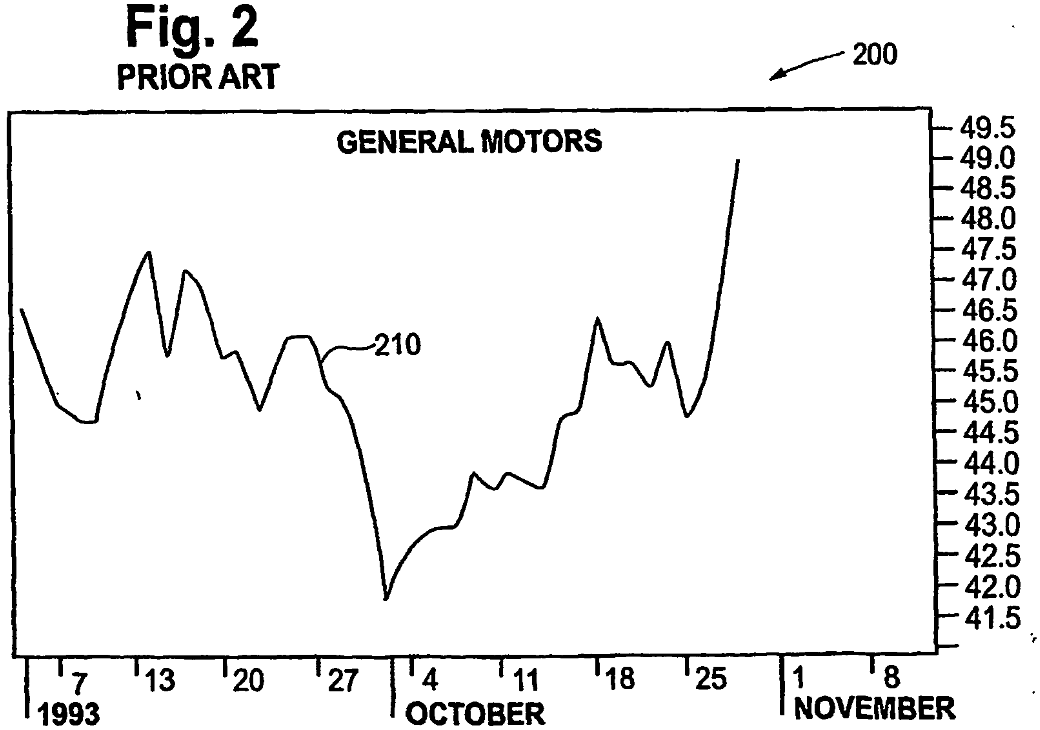


Fig. 3
PRIOR ART

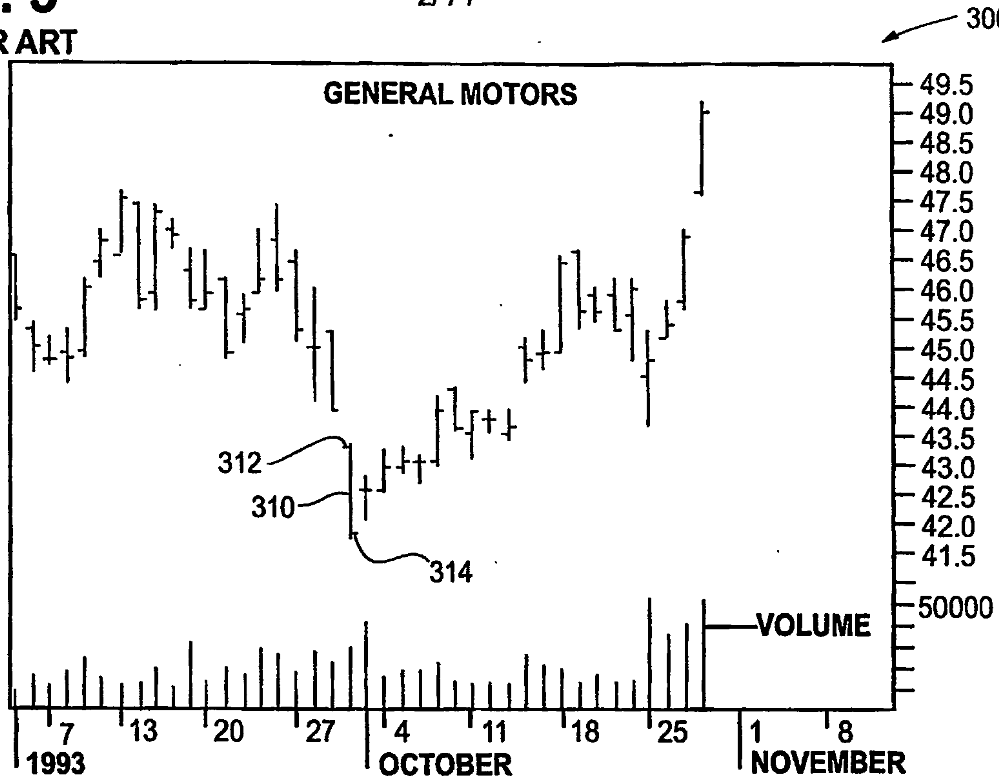


Fig. 4
PRIOR ART

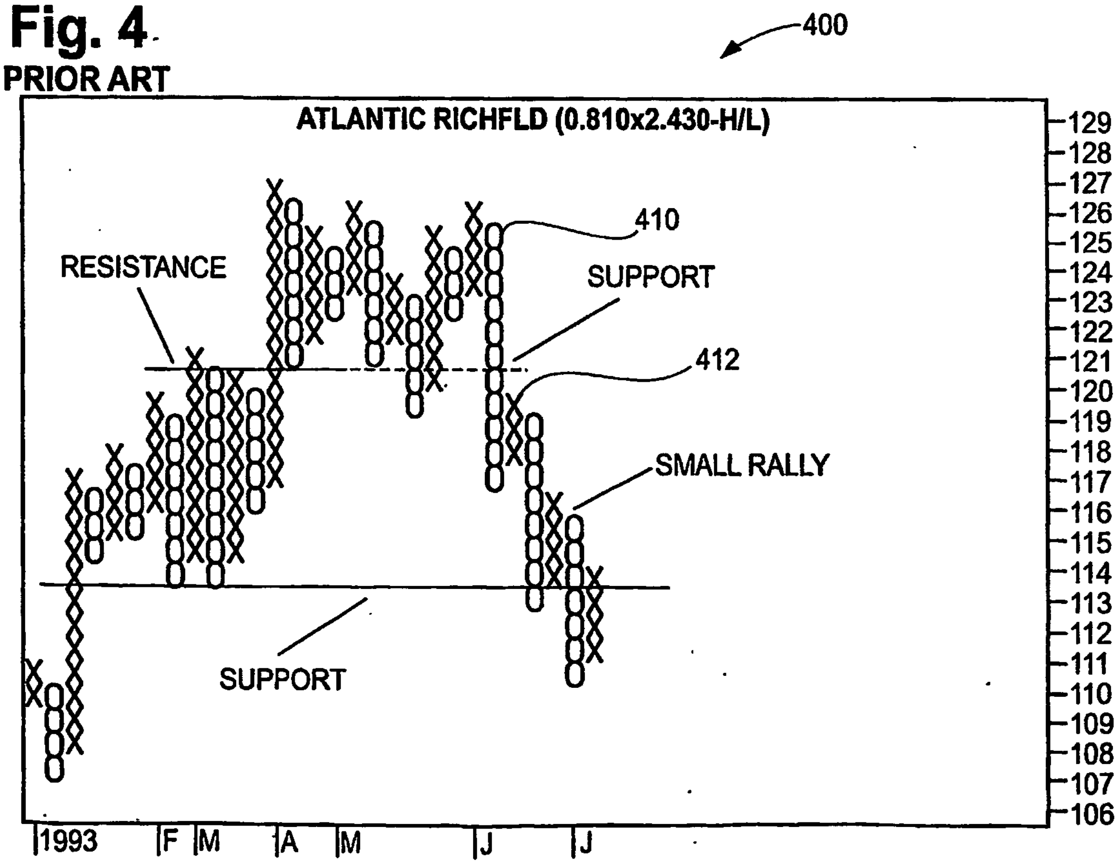


Fig. 5
PRIOR ART

500

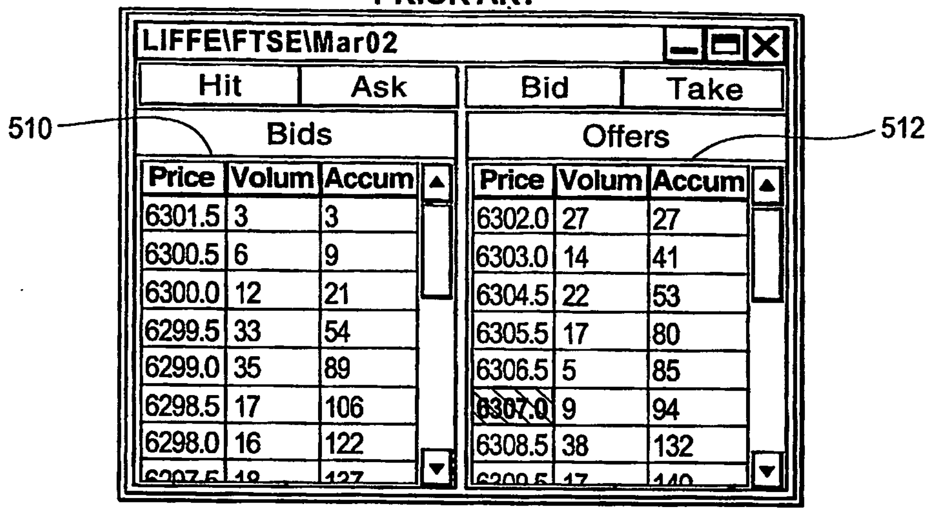


Fig. 6
PRIOR ART

610

600

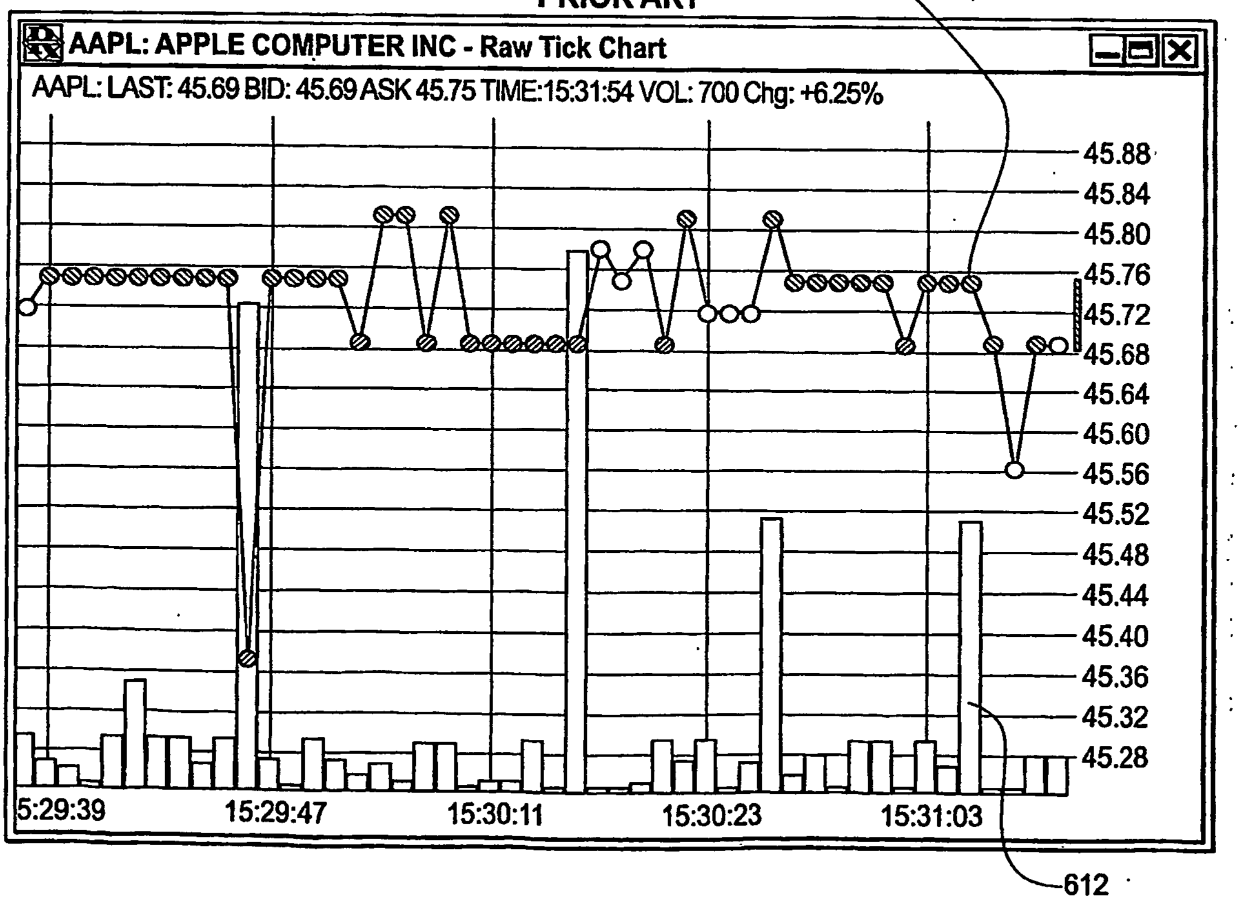


Fig. 7

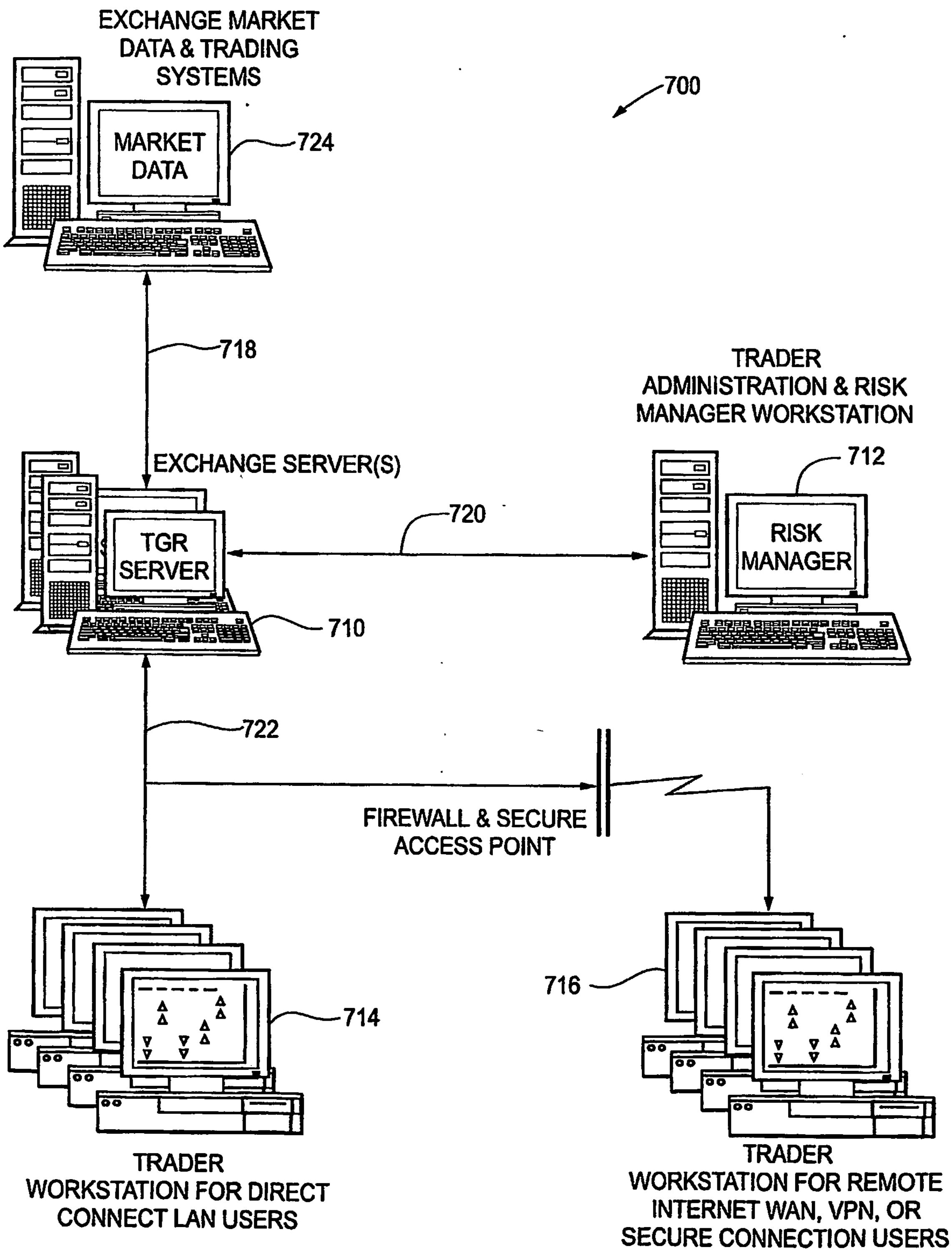
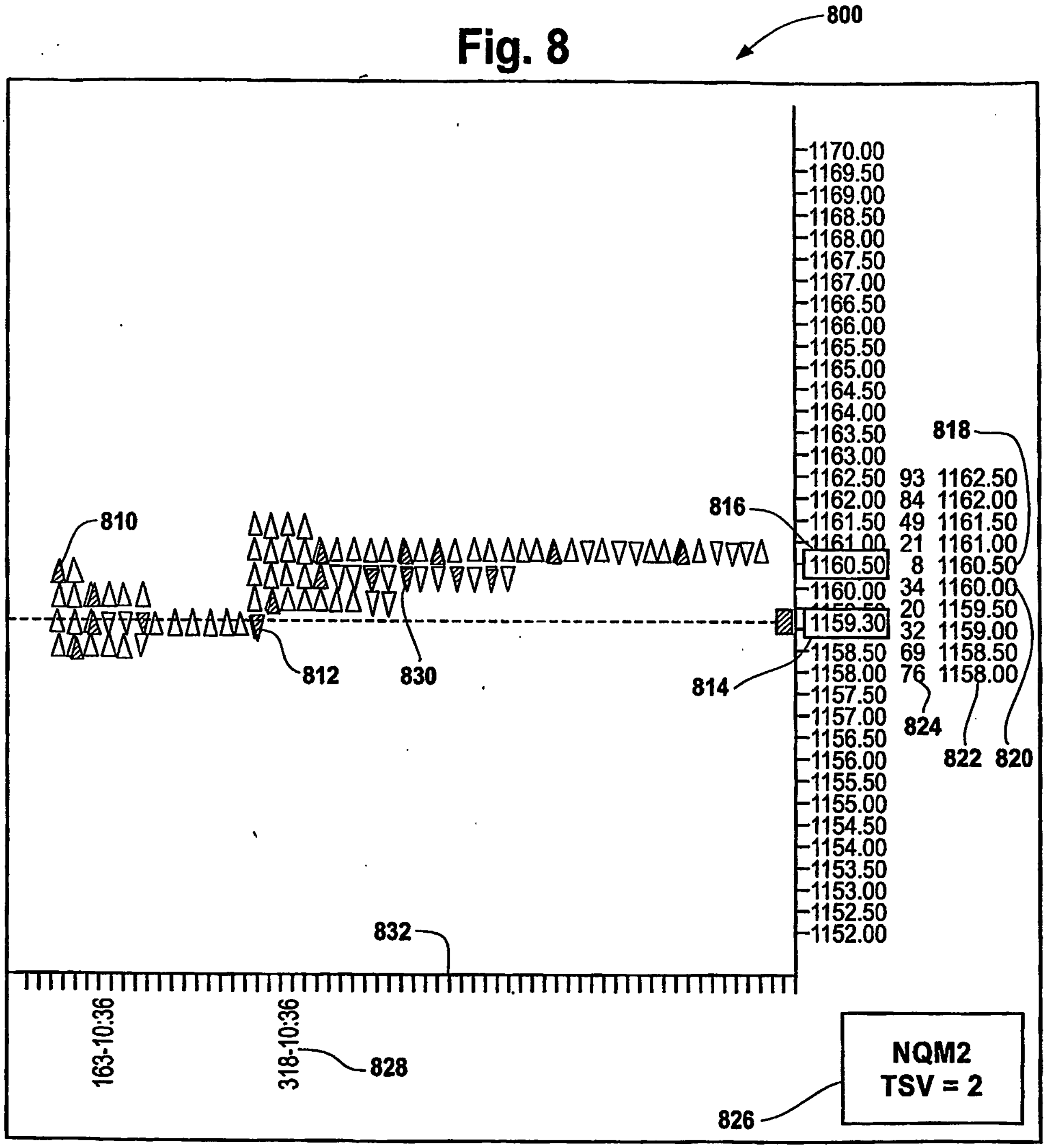

EXCHANGE MARKET
DATA & TRADING
SYSTEMS
700
MARKET
DATA
724
718
TRADER
ADMINISTRATION & RISK
MANAGER WORKSTATION
EXCHANGE SERVER(S)
712
720
TGR
SERVER
RISK
MANAGER
710
722
FIREWALL & SECURE
ACCESS POINT
716
714
TRADER
WORKSTATION FOR DIRECT
CONNECT LAN USERS
TRADER
WORKSTATION FOR REMOTE
INTERNET WAN, VPN, OR
SECURE CONNECTION USERS

Fig. 8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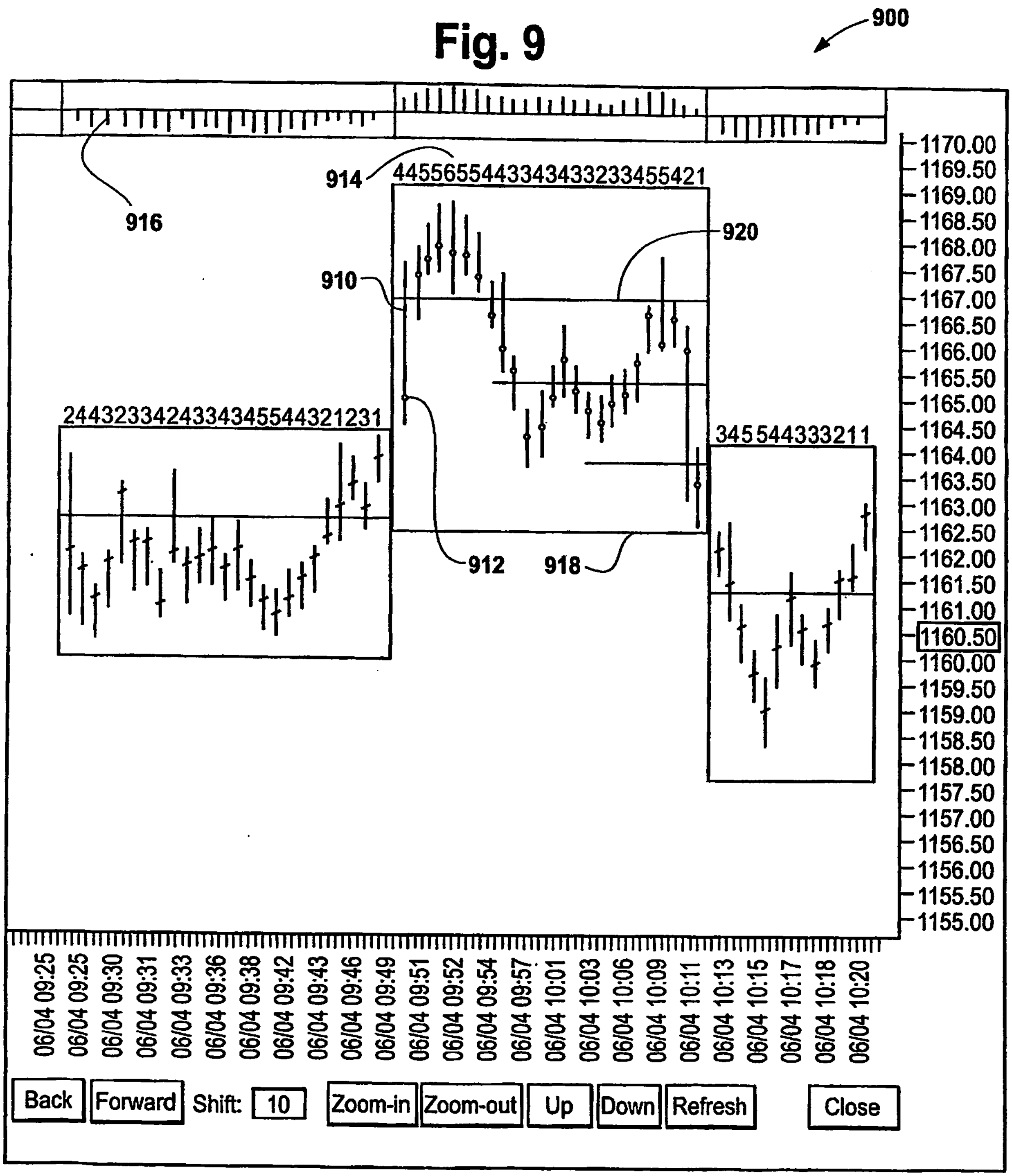
810
812
830
814
816
818
820
822
824
826
828
832
1170.00
1169.50
1169.00
1168.50
1168.00
1167.50
1167.00
1166.50
1166.00
1165.50
1165.00
1164.50
1164.00
1163.50
1163.00
1162.50 93 1162.50
1162.00 84 1162.00
1161.50 49 1161.50
1161.00 21 1161.00
1160.50 8 1160.50
1160.00 34 1160.00
20 1159.50
1159.30 32 1159.00
1158.50 69 1158.50
1158.00 76 1158.00
1157.50
1157.00
1156.50
1156.00
1155.50
1155.00
1154.50
1154.00
1153.50
1153.00
1152.50
1152.00
163-10:36
318-10:36
NQM2
TSV = 2

Fig. 9


900
914
916
910
920
912
918
2443233424334345544321231
4455655443343433233455421
345544333211
1170.00
1169.50
1169.00
1168.50
1168.00
1167.50
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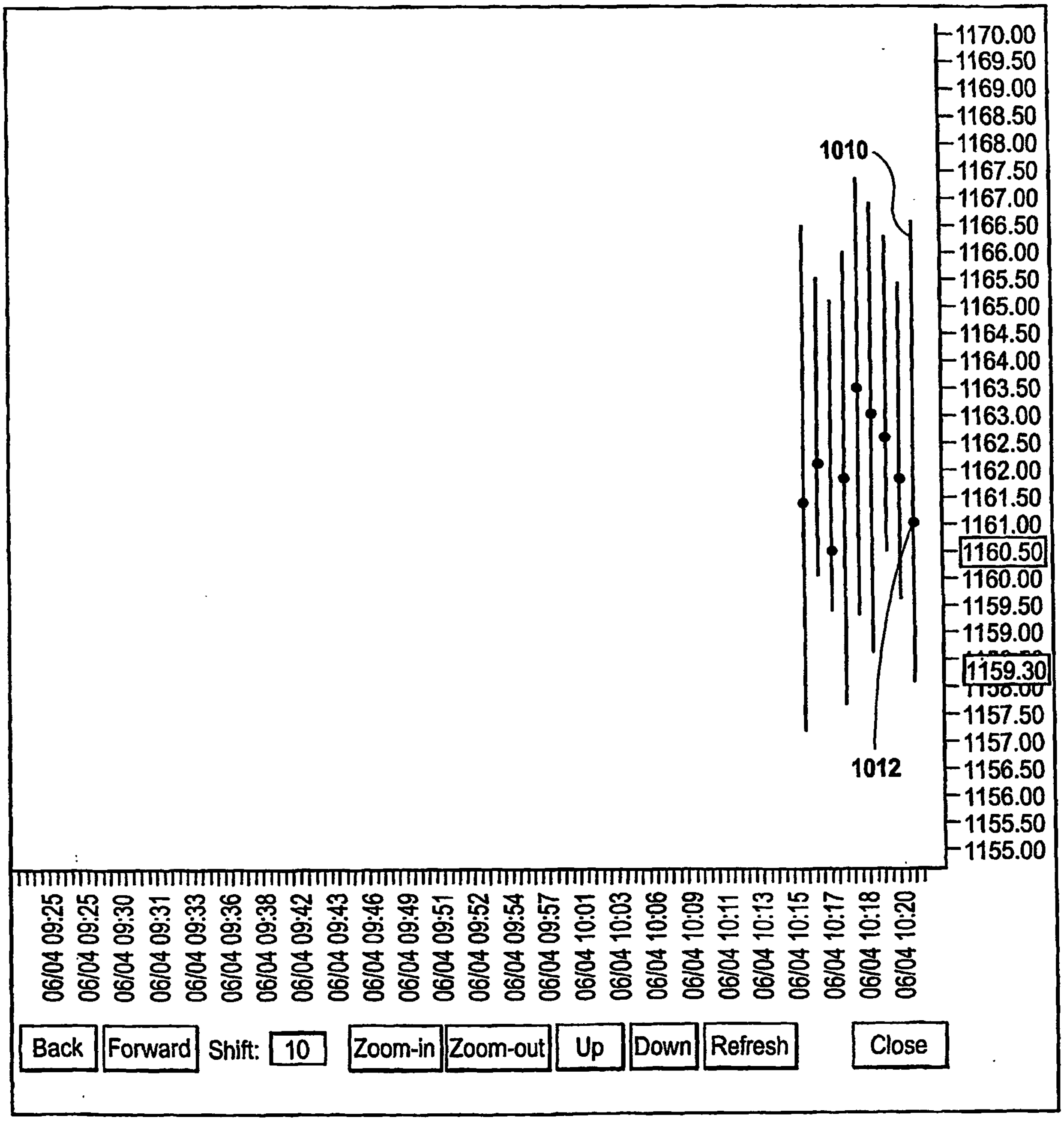
06/04 09:25
06/04 09:30
06/04 09:31
06/04 09:33
06/04 09:36
06/04 09:38
06/04 09:42
06/04 09:43
06/04 09:46
06/04 09:49
06/04 09:51
06/04 09:52
06/04 09:54
06/04 09:57
06/04 10:01
06/04 10:03
06/04 10:06
06/04 10:09
06/04 10:11
06/04 10:13
06/04 10:15
06/04 10:17
06/04 10:18
06/04 10:20
Back
Forward
Shift: 10
Zoom-in
Zoom-out
Up
Down
Refresh
Close

Fig. 10

1000


1010
1012
1170.00
1169.50
1169.00
1168.50
1168.00
1167.50
1167.00
1166.50
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06/04 09:36
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06/04 09:42
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06/04 09:51
06/04 09:52
06/04 09:54
06/04 09:57
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06/04 10:06
06/04 10:09
06/04 10:11
06/04 10:13
06/04 10:15
06/04 10:17
06/04 10:18
06/04 10:20
Back
Forward
Shift: 10
Zoom-in
Zoom-out
Up
Down
Refresh
Close

Fig. 11A

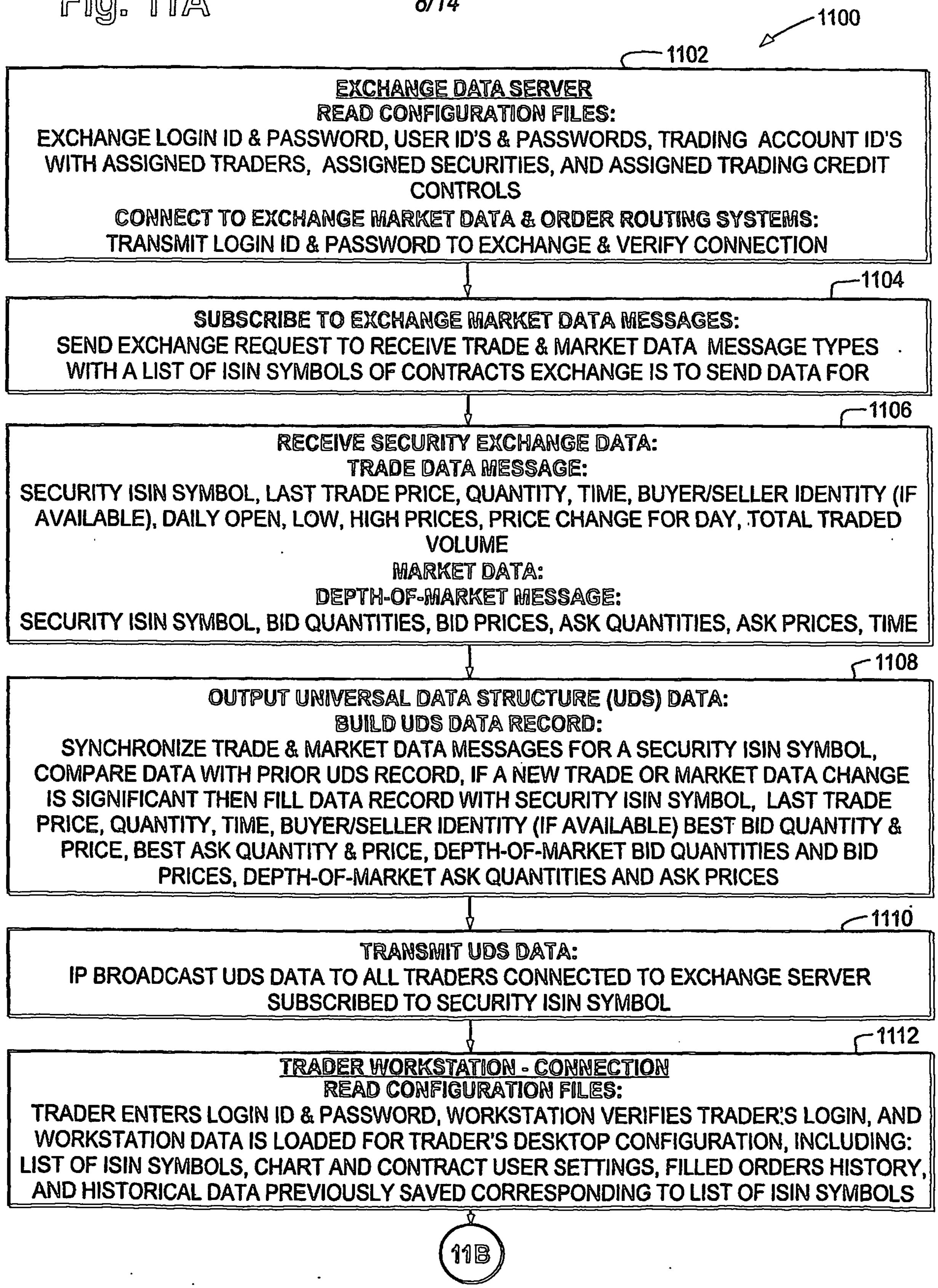
1100
1102
EXCHANGE DATA SERVER
READ CONFIGURATION FILES:
EXCHANGE LOGIN ID & PASSWORD, USER ID'S & PASSWORDS, TRADING ACCOUNT ID'S WITH ASSIGNED TRADERS, ASSIGNED SECURITIES, AND ASSIGNED TRADING CREDIT CONTROLS
CONNECT TO EXCHANGE MARKET DATA & ORDER ROUTING SYSTEMS:
TRANSMIT LOGIN ID & PASSWORD TO EXCHANGE & VERIFY CONNECTION
1104
SUBSCRIBE TO EXCHANGE MARKET DATA MESSAGES:
SEND EXCHANGE REQUEST TO RECEIVE TRADE & MARKET DATA MESSAGE TYPES WITH A LIST OF ISIN SYMBOLS OF CONTRACTS EXCHANGE IS TO SEND DATA FOR
1106
RECEIVE SECURITY EXCHANGE DATA:
TRADE DATA MESSAGE:
SECURITY ISIN SYMBOL, LAST TRADE PRICE, QUANTITY, TIME, BUYER/SELLER IDENTITY (IF AVAILABLE), DAILY OPEN, LOW, HIGH PRICES, PRICE CHANGE FOR DAY, TOTAL TRADED VOLUME
MARKET DATA:
DEPTH-OF-MARKET MESSAGE:
SECURITY ISIN SYMBOL, BID QUANTITIES, BID PRICES, ASK QUANTITIES, ASK PRICES, TIME
1108
OUTPUT UNIVERSAL DATA STRUCTURE (UDS) DATA:
BUILD UDS DATA RECORD:
SYNCHRONIZE TRADE & MARKET DATA MESSAGES FOR A SECURITY ISIN SYMBOL, COMPARE DATA WITH PRIOR UDS RECORD, IF A NEW TRADE OR MARKET DATA CHANGE IS SIGNIFICANT THEN FILL DATA RECORD WITH SECURITY ISIN SYMBOL, LAST TRADE PRICE, QUANTITY, TIME, BUYER/SELLER IDENTITY (IF AVAILABLE) BEST BID QUANTITY & PRICE, BEST ASK QUANTITY & PRICE, DEPTH-OF-MARKET BID QUANTITIES AND BID PRICES, DEPTH-OF-MARKET ASK QUANTITIES AND ASK PRICES
1110
TRANSMIT UDS DATA:
IP BROADCAST UDS DATA TO ALL TRADERS CONNECTED TO EXCHANGE SERVER SUBSCRIBED TO SECURITY ISIN SYMBOL
1112
TRADER WORKSTATION - CONNECTION
READ CONFIGURATION FILES:
TRADER ENTERS LOGIN ID & PASSWORD, WORKSTATION VERIFIES TRADER'S LOGIN, AND WORKSTATION DATA IS LOADED FOR TRADER'S DESKTOP CONFIGURATION, INCLUDING: LIST OF ISIN SYMBOLS, CHART AND CONTRACT USER SETTINGS, FILLED ORDERS HISTORY, AND HISTORICAL DATA PREVIOUSLY SAVED CORRESPONDING TO LIST OF ISIN SYMBOLS
11B

Fig. 11B

(11A)

1114

CONNECT TO EXCHANGE SERVER(S):
TRANSMIT LOGIN ID, PASSWORD AND LIST OF ISIN SYMBOLS TO EXCHANGE SERVER(S) & VERIFY CONNECTION(S)

1116

TRADER WORKSTATION - PROCESS DATA
RECEIVE UNIVERSAL DATA SET (UDS) DATA:
SECURITY ISIN SYMBOL, LAST TRADE PRICE, QUANTITY, TIME, BUYER/SELLER IDENTITY, BEST BID/ASK QUANTITY & PRICE, DEPTH-OF-MARKET QUANTITIES & PRICES

1118

EVALUATE UDS DATA FOR AUCTION EVENT:
COMPARE UDS DATA WITH PRIOR UDS FOR SAME ISIN SYMBOL. IF UDS CONTAINS A NEW TRADE, EVALUATE ORDER INITIATION CRITERIA:

1120

EVALUATE TRADE FOR ORDER INITIATION:
IF TRADE PRICE >= BEST ASK PRICE THEN TRADE INITIATED BY A BUYER, ELSE
IF TRADE PRICE <= BEST BID PRICE THEN TRADE INITIATED BY A SELLER, ELSE
TRADE INITIATION IS UNKNOWN

1122

ASSIGN ICONIC REPRESENTATION TO TRADE DATA
EVALUATE TRADE & ASSIGN ICON:
IF TRADE PRICE >= BEST ASK PRICE THEN TRADE INITIATED BY A BUYER, ASSIGN UPWARD TRIANGLE, ELSE
IF TRADE PRICE <= BEST BID PRICE THEN TRADE INITIATED BY A SELLER, ASSIGN DOWNWARD TRIANGLE, ELSE TRADE INITIATION IS UNKNOWN, ASSIGN DIAMOND

1124

EVALUATE QUANTITY & ASSIGN ICON ATTRIBUTE:

```
DO CASE
CASE QUANTITY <= FILTER QUANTITY LEVEL 1
     ASSIGN LIGHT GREY COLOR UNFILLED ICON
CASE QUANTITY > FILTER QUANTITY LEVEL 1 AND
     QUANTITY <= FILTER QUANTITY LEVEL 2
     IF BUYER, ASSIGN THIN BLUE COLOR UNFILLED ICON, ELSE
     IF SELLER, ASSIGN THIN RED COLOR UNFILLED ICON, ELSE
     ASSIGN THIN BLACK COLOR UNFILLED ICON
CASE QUANTITY > FILTER QUANTITY LEVEL 2 AND
     QUANTITY <= FILTER QUANTITY LEVEL 3
     IF BUYER, ASSIGN THICK BLUE COLOR UNFILLED ICON, ELSE
     IF SELLER, ASSIGN THICK RED COLOR UNFILLED ICON, ELSE
     ASSIGN THICK BLACK COLOR UNFILLED ICON
CASE QUANTITY > FILTER QUANTITY LEVEL 3 AND
     QUANTITY <= FILTER QUANTITY LEVEL 4
     IF BUYER, ASSIGN BLUE COLOR FILLED ICON ELSE
     IF SELLER, ASSIGN RED COLOR FILLED ICON ELSE
     ASSIGN GREY COLOR FILLED ICON
CASE QUANTITY > FILTER QUANTITY LEVEL 4
     IF BUYER, ASSIGN DARK BLUE COLOR FILLED ICON ELSE
     IF SELLER, ASSIGN DARK RED COLOR FILLED ICON ELSE
     ASSIGN BLACK COLOR FILLED ICON
```

(11C)

Fig. 11C

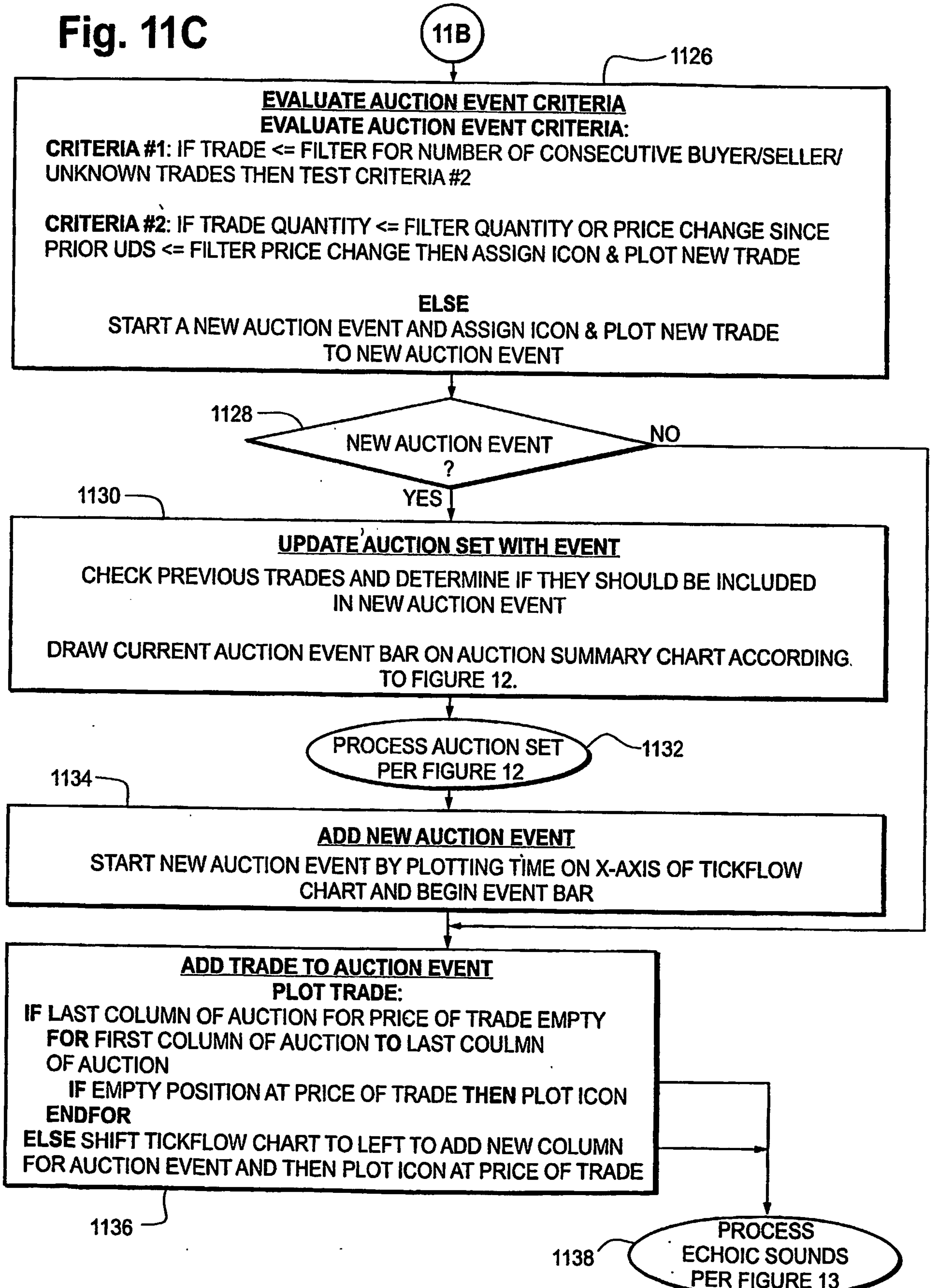
11B
1126
EVALUATE AUCTION EVENT CRITERIA
EVALUATE AUCTION EVENT CRITERIA:
CRITERIA #1: IF TRADE <= FILTER FOR NUMBER OF CONSECUTIVE BUYER/SELLER/ UNKNOWN TRADES THEN TEST CRITERIA #2
CRITERIA #2: IF TRADE QUANTITY <= FILTER QUANTITY OR PRICE CHANGE SINCE PRIOR UDS <= FILTER PRICE CHANGE THEN ASSIGN ICON & PLOT NEW TRADE
ELSE
START A NEW AUCTION EVENT AND ASSIGN ICON & PLOT NEW TRADE TO NEW AUCTION EVENT
1128
NEW AUCTION EVENT ?
NO
YES
1130
UPDATE AUCTION SET WITH EVENT
CHECK PREVIOUS TRADES AND DETERMINE IF THEY SHOULD BE INCLUDED IN NEW AUCTION EVENT
DRAW CURRENT AUCTION EVENT BAR ON AUCTION SUMMARY CHART ACCORDING TO FIGURE 12.
PROCESS AUCTION SET PER FIGURE 12
1132
1134
ADD NEW AUCTION EVENT
START NEW AUCTION EVENT BY PLOTTING TIME ON X-AXIS OF TICKFLOW CHART AND BEGIN EVENT BAR
ADD TRADE TO AUCTION EVENT
PLOT TRADE:
IF LAST COLUMN OF AUCTION FOR PRICE OF TRADE EMPTY
FOR FIRST COLUMN OF AUCTION TO LAST COULMN OF AUCTION
IF EMPTY POSITION AT PRICE OF TRADE THEN PLOT ICON
ENDFOR
ELSE SHIFT TICKFLOW CHART TO LEFT TO ADD NEW COLUMN FOR AUCTION EVENT AND THEN PLOT ICON AT PRICE OF TRADE
1136
1138
PROCESS ECHOIC SOUNDS PER FIGURE 13

Fig. 12A

1200

1210

INPUT DATA

INPUT CURRENT AUCTION EVENT DATA:

PRICES: LOW, HIGH, VOL. WTD. AVG.
VOLUME: BUYER, SELLER, TOTAL VOLUME, TOTAL TRADES

INPUT PREVIOUS AUCTION EVENT DATA: PRICE: VOL. WTD. AVG.

INPUT AUCTION SET DATA:
PRICES: VOL. WTD. AVG. BEFORE CURRENT EVENT, VOL. WTD. AVG. INCLUDING CURRENT EVENT

INPUT MARKET DATA:
CASH MARKET PRICES: BEST BID, BEST ASK
DEPTH-OF-MARKET PRICES: VOL. WTD. AVG. BID, VOL. WTD. AVG. ASK

1212

EVALUATE DATA

INITIALIZE: TREND STATUS VALUE = 0

EVALUATE 8 TSV CRITERIA:

CRITERIA #1: IF AUCTION EVENT BUYER VOLUME > AUCTION EVENT SELLER VOLUME ADD 1 TO TSV, **ELSE** IF NOT EQUAL SUBTRACT 1 FROM TSV

CRITERIA #2: IF CASH MARKET BEST ASK PRICE > AUCTION SET VOL. WTD. AVG. PRICE, ADD 1 TO TSV, **ELSE** IF NOT EQUAL SUBTRACT 1 FROM TSV

CRITERIA #3: IF CASH MARKET BEST BID PRICE > AUCTION SET VOL. WTD. AVG. PRICE, ADD 1 TO TSV, **ELSE** IF NOT EQUAL SUBTRACT 1 FROM TSV

CRITERIA #4: IF DEPTH-OF-MARKET VOL. WTD. AVG. ASK PRICE > AUCTION SET VOL. WTD. AVG. PRICE, ADD 1 TO TSV, **ELSE** IF NOT EQUAL SUBTRACT 1 FROM TSV

CRITERIA #5: IF DEPTH-OF-MARKET VOL. WTD. AVG. BID PRICE > AUCTION SET VOL. WTD. AVG. PRICE, ADD 1 TO TSV, **ELSE** IF NOT EQUAL SUBTRACT 1 FROM TSV

CRITERIA #6: IF CURRENT AUCTION SET VOL. WTD. AVG. PRICE > PREVIOUS AUCTION SET VOL. WTD. AVG. PRICE, ADD 1 TO TSV, **ELSE** IF NOT EQUAL SUBTRACT 1 FROM TSV

CRITERIA #7: IF CURRENT AUCTION EVENT VOL. WTD. AVG. PRICE > PREVIOUS AUCTION EVENT VOL. WTD. AVG. PRICE, ADD 1 TO TSV, **ELSE** IF NOT EQUAL SUBTRACT 1 FROM TSV

CRITERIA #8: IF CURRENT AUCTION EVENT VOL. WTD. AVG. PRICE > CURRENT AUCTION SET VOL. WTD. AVG. PRICE, ADD 1 TO TSV, **ELSE** IF NOT EQUAL SUBTRACT 1 FROM TSV

12B

Fig. 12B

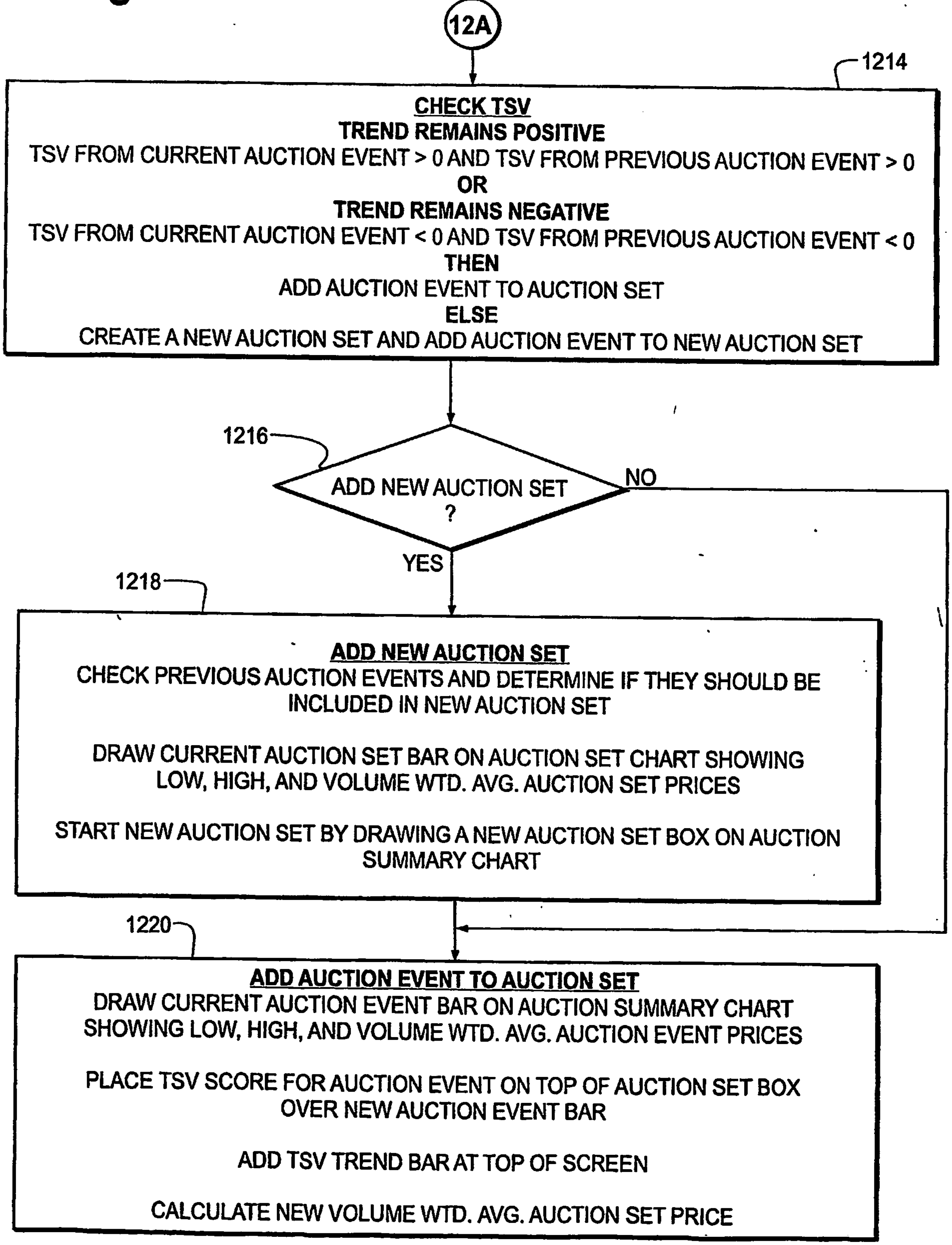
12A
1214
CHECK TSV
TREND REMAINS POSITIVE
TSV FROM CURRENT AUCTION EVENT > 0 AND TSV FROM PREVIOUS AUCTION EVENT > 0
OR
TREND REMAINS NEGATIVE
TSV FROM CURRENT AUCTION EVENT < 0 AND TSV FROM PREVIOUS AUCTION EVENT < 0
THEN
ADD AUCTION EVENT TO AUCTION SET
ELSE
CREATE A NEW AUCTION SET AND ADD AUCTION EVENT TO NEW AUCTION SET
1216
ADD NEW AUCTION SET ?
NO
YES
1218
ADD NEW AUCTION SET
CHECK PREVIOUS AUCTION EVENTS AND DETERMINE IF THEY SHOULD BE INCLUDED IN NEW AUCTION SET
DRAW CURRENT AUCTION SET BAR ON AUCTION SET CHART SHOWING LOW, HIGH, AND VOLUME WTD. AVG. AUCTION SET PRICES
START NEW AUCTION SET BY DRAWING A NEW AUCTION SET BOX ON AUCTION SUMMARY CHART
1220
ADD AUCTION EVENT TO AUCTION SET
DRAW CURRENT AUCTION EVENT BAR ON AUCTION SUMMARY CHART SHOWING LOW, HIGH, AND VOLUME WTD. AVG. AUCTION EVENT PRICES
PLACE TSV SCORE FOR AUCTION EVENT ON TOP OF AUCTION SET BOX OVER NEW AUCTION EVENT BAR
ADD TSV TREND BAR AT TOP OF SCREEN
CALCULATE NEW VOLUME WTD. AVG. AUCTION SET PRICE

Fig. 13A

1300

1310

INPUT DATA

INPUT CURRENT UDS TICK DATA:
LAST TRADE QUANTITY

INPUT CURRENT APPLICATION VALUES:
BUYER/SELLER/NEUTRAL ORDER INITIATION INDICATOR

INPUT MARKET DATA:
CASH MARKET PRICES: LAST TRADE, BEST BID, BEST ASK

DEPTH-OF-MARKET PRICES:
VOL. WTD. AVG. BID, VOL. WTD. AVG. ASK

1312

EVALUATE AND ASSIGN ECHOIC SOUNDS

EVALUATE LAST TRADE & ASSIGN SOUND:

```
DO CASE
CASE QUANTITY <= FILTER QUANTITY LEVEL 1
        IF BUYER, ASSIGN BUYER SOUND 1, ELSE
        IF SELLER, ASSIGN SELLER SOUND 1, ELSE
        ASSIGN NEUTRAL SOUND 1
CASE QUANTITY > FILTER QUANTITY LEVEL 1 AND
QUANTITY <= FILTER QUANTITY LEVEL 2
        IF BUYER, ASSIGN BUYER SOUND 2, ELSE
        IF SELLER, ASSIGN SELLER SOUND 2, ELSE
        ASSIGN NEUTRAL SOUND 2
CASE QUANTITY > FILTER QUANTITY LEVEL 2 AND
QUANTITY <= FILTER QUANTITY LEVEL 3
        IF BUYER, ASSIGN BUYER SOUND 3, ELSE
        IF SELLER, ASSIGN SELLER SOUND 3, ELSE
        ASSIGN NEUTRAL SOUND 3
CASE QUANTITY > FILTER QUANTITY LEVEL 3 AND
QUANTITY <= FILTER QUANTITY LEVEL 4
        IF BUYER, ASSIGN BUYER SOUND 4, ELSE
        IF SELLER, ASSIGN SELLER SOUND 4, ELSE
        ASSIGN NEUTRAL SOUND 4
CASE QUANTITY > FILTER QUANTITY LEVEL 4
        IF BUYER, ASSIGN BUYER SOUND 5, ELSE
        IF SELLER, ASSIGN SELLER SOUND 5, ELSE
        ASSIGN NEUTRAL SOUND 5
```

13B

Fig. 13B

13A

1314

EVALUATE & ASSIGN ECHOIC SOUNDS

EVALUATE CASH MARKET & ASSIGN SOUNDS:

IF CASH ASK PRICE > PRIOR CASH ASK PRICE THEN
ASSIGN CASH ASK UP SOUND, ELSE
IF CASH ASK PRICE < PRIOR CASH ASK PRICE THEN
ASSIGN CASH ASK DOWN SOUND.

IF CASH BID PRICE > PRIOR CASH BID PRICE THEN
ASSIGN CASH BID UP SOUND, ELSE
IF CASH BID PRICE < PRIOR CASH BID PRICE THEN
ASSIGN CASH BID DOWN SOUND.

IF CASH TRADE PRICE > PRIOR CASH TRADE PRICE THEN
ASSIGN CASH TRADE UP SOUND, ELSE
IF CASH TRADE PRICE < PRIOR CASH TRADE PRICE THEN
ASSIGN CASH TRADE DOWN SOUND

1316

EVALUATE DEPTH-OF-MARKET & ASSIGN SOUND:

IF AVG. ASK PRICE > PRIOR AVG. ASK PRICE THEN
ASSIGN AVG. ASK UP SOUND, ELSE
IF AVG. ASK PRICE < PRIOR AVG. ASK PRICE THEN
ASSIGN AVG. ASK DOWN SOUND.

IF AVG. BID PRICE > PRIOR AVG. BID PRICE THEN
ASSIGN AVG. BID UP SOUND, ELSE
IF AVG. BID PRICE < PRIOR AVG. BID PRICE THEN
ASSIGN AVG. BID DOWN SOUND.